

### REMARKS

Claims 1-3 are pending in the present Application. Claims 1 and 2 have been amended, Claim 3 has been canceled, and no claim has been added, leaving Claims 1 and 2 for consideration upon entry of the present Amendment. In addition, a Declaration under 37 CFR § 1.132 is submitted upon entry of and in support of the present Amendment as described in the remarks below.

Claim 1 has been amended include the limitations of Claim 3. Accordingly, Claim 3 is canceled upon entry of the present amendment. Claim 1 has also been amended to remove the phrase "alcohol is a hydrocarbon compound", as explained in the remarks below. Claim 1 has been further amended to include the descriptive phrase "alkyl aldehyde group-containing".

Support for this amendment can be found in Claim 2 and in the Specification as provided in PCT application no. KR2004/001350 on p. 5, lines 1-4.

Claim 2 has been amended to include the term "alkyl" in describing "aldehyde". Support for this amendment is found in the Specification as provided in PCT application no. KR2004/001350 on p. 5, lines 1-4.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above Amendments and the following remarks.

#### Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-3 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, the Examiner has stated that the phrase defining the alcohol as being a hydrocarbon compound is unclear. Accordingly, the phrase "alcohol is a hydrocarbon compound" has been removed from Claim 1. Applicants believe that this Amendment fully addresses the Examiner's concerns, and that Claim 1 and its dependent claims should therefore now be free of any alleged indefiniteness with entry of the present amendment. Applicants therefore respectfully request reconsideration and withdrawal of the rejection.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1 and 2 are rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 4,147,884 ("Sheng"). Applicants respectfully traverse this rejection.

Sheng discloses a process for liquid phase oxidation of an unsaturated lower aliphatic aldehyde to the corresponding carboxylic acid. Col. 1, lines 58-61. Oxidation is carried out by passage of an oxygen containing gas through a liquid medium containing the unsaturated aldehyde and a fluorine-containing organic compound. Col. 2, lines 4-7.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Varient Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987).

Sheng discloses the oxidation of alpha-beta unsaturated aldehydes having from 3-6 carbon atoms. Col. 2, lines 32-33. The aldehydes include acrolein, methacrolein, crotonaldehyde, alpha-crotonaldehyde, alpha-chloroacrolein, beta-ethylacrylic, beta,beta-dimethylacrylic, and 2-hexenal. Col. 2, lines 34-37. Sheng does not teach or disclose the use of the method described therein to the oxidation of saturated aldehydes.

Claim 1 as amended claims a method for producing an organic acid from alkyl aldehyde group-containing compounds (i.e., saturated aldehydes; see the Specification as provided in PCT application no. KR2004/001350 on p. 5, lines 1-4). Sheng fails to disclose the aldehydes claimed in Claim 1, and thus fails to disclose all elements of Claim 1. Therefore Sheng does not anticipate Claim 1 or its dependents. Accordingly, reconsideration, withdrawal of the rejection, and allowance of the claims are respectfully requested.

Claim Rejections Under 35 U.S.C. § 103(a)

Claim 3 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Sheng. Applicants respectfully traverse this rejection.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that

would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

The Examiner notes in the Final Office Action dated July 18, 2006 that Sheng fails to explicitly teach those specific aldehyde group-containing compounds recited in Claim 3, and contends that Sheng allegedly teaches a reasonable expectation for success for oxidizing saturated aldehydes based on a mention of saturated aldehydes in the background of Sheng. The Examiner further asserts that “[t]he mention of saturated aldehydes teaches the elements of the claimed aldehydes with sufficient guidance, particularity, and with a reasonable expectation of success, that the invention would be *prima facie* obvious to one of ordinary skill.” Office Action, p. 5, lines 15-17. Applicants respectfully disagree, and assert that no teaching is made in Sheng that would motivate one skilled in the art to apply the method of Sheng to oxidation of saturated aldehydes. Saturated aldehydes are mentioned briefly as a general description of background to define by contrast the problem specifically addressed in Sheng. Col. 1, lines 10-14. Sheng also teaches, in the background section, that liquid phase oxidation may be applied to unsaturated aliphatic aldehydes, generally using metal catalysts, but fails to broaden this teaching to a saturated aldehyde. Col. 1, lines 31-39 (emphasis added). However, no clear disclosure, teaching, or mention is made or inferred in Sheng of a process or method, specific or general, for providing a saturated carboxylic acid from a saturated aldehyde, only that “saturated aldehydes are relatively easily oxidized to carboxylic acids.” Col. 1, lines 10-11.

Obviousness is not based upon what an artisan could do or what an artisan may try, but is based upon what an artisan would be motivated to do with an expectation of success. “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, No. 04-1616 (CAFC March 22, 2006) citing

*In re Lee*, 277 F.3d 1338, 1343-46 (Fed. Cir. 2002); and *In re Rouffett*, 149 F.3d 1350, 1355-59 (Fed. Cir. 1998). “When the [Examiner] does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, [it is] infer[ed] that the [Examiner] used hindsight to conclude that the invention was obvious.” *Id.* Additionally, “[a]lthough the suggestion to combine references may flow from the nature of the problem, ‘[d]efining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness.’” (internal citation omitted) *Id.*, quoting *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998); *In re Beattie*, 974 F.2d 1309, 1312 (Fed. Cir. 1992).

Thus when, as here, the Section 103 rejection was based on selective combination of the prior art references to allegedly render a subsequent invention obvious, “there must be some reason for the combination other than the hind sight gleaned from the invention itself.” *Id.* Stated in another way, “[i]t is impermissible to use the claimed invention as an instruction manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” *In re Fritch* 23 U.S.P.Q.2d 1780, 1784 (Fed. Cir. 1992). In no part of the background, summary or description of Sheng is mention made as to the applicability of the method of Sheng to saturated aldehydes. One skilled in the art will appreciate from the teaching of Sheng that there may be numerous methods of oxidation available for saturated aldehydes, but that Sheng provides no teaching as to what such a method would constitute, or whether the method is applicable to any aldehyde or only to a specific type of aldehyde. A randomly selected oxidation method as implied by the teaching of Sheng, absent a teaching that directs the practitioner to a specific method or class of methods, could as easily direct the practitioner to apply any method randomly to any aldehyde and with no expectation of success. Sheng teaches at least two general types of oxidation methods, those using metal catalysts and without metal catalysts, (see background, Col. 1, lines 31-45), but provides only a teaching that these methods, including also the method disclosed in Sheng, are useful for *unsaturated* aldehydes and is silent as to the applicability of these methods to saturated aldehydes. Thus there is no teaching or disclosure in Sheng that would motivate one skilled in the art to modify the prior art to use saturated aldehydes, and

there is further no teaching that provides a reasonable expectation for success of the combination of saturated aldehydes with the method of Sheng to provide the method claimed in present application. Accordingly, reconsideration, withdrawal of the rejection, and allowance of the claims are respectfully requested.

In addition, in applying Section 103, the U.S. Court of Appeals for the Federal Circuit has consistently held that one must consider both the invention and the prior art "as a whole", not from improper hindsight gained from consideration of the claimed invention. See, *Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543, 551 (Fed. Cir. 1985) and cases cited therein. According to the *Interconnect* court

[n]ot only must the claimed invention as a whole be evaluated, but so also must the references as a whole, so that their teachings are applied in the context of their significance to a technician at the time - a technician without our knowledge of the solution.

*Id.* Also critical to this Section 103 analysis is that understanding of "particular results" achieved by the invention. *Id.*

Sheng requires the use of a fluorinated organic compound. Col. 2, lines 4-7. Sheng teaches that the essential feature is that oxidation of the unsaturated aldehyde is carried out in the presence of at least one fluorinated organic compound in the liquid state. Col. 2, lines 8-11, and 51-54. The fluorinated organic compound may be used as the sole solvent-diluent or in combination with a non-fluorinated co-solvent. Col. 3, lines 62-64. One skilled in the art will appreciate from these combined disclosures that Sheng unequivocally teaches the use of a fluorinated organic compound to achieve oxidation, and that it can be reasonably concluded by the practitioner that a fluorinated organic compound is essential to the functioning of the method of oxidation of Sheng as a whole. This essential element of a fluorinated organic compound disclosed and taught in Sheng is neither claimed in the instant claims, nor taught in the instant Specification of the present invention. Thus, the method of the present invention is, on the whole, not disclosed or taught by Sheng, and is therefore not unpatentable over Sheng.

In addition, with respect to the method of the instant claims itself and to address any alleged interchangeability of saturated and unsaturated aldehydes oxidized using the method

claimed herein, the inventors hereof have found an unexpected benefit that accrues from use of the method of the instant claims with a saturated alkyl aldehyde over an unsaturated lower aliphatic aldehyde. As shown in the Declaration of Sang-gi Lee, attached hereto, in a comparative example using the method of the instant claims, the conversion rate of an unsaturated aldehyde (2-ethylhexenal) was found to be 82% and the selectivity of the corresponding organic acid was found to be 68% for the oxidation of the unsaturated aldehyde as resulting from the above-described reaction. These rates are significantly lower when compared with the corresponding conversion rates (98.1-99.9%) and selectivities (93.1-97.5%) obtained for exemplary saturated aldehydes (i.e., alkyl aldehyde group-containing compounds) run under identical conditions as shown in the above-mentioned application (Table 1. on p. 13 of the Specification as provided in PCT application no. KR2004/001350; see the data for Examples 1-9). These significant improvements are neither taught nor suggested by the prior art, and further demonstrate that the method of Sheng and its application is not equivalent to the method and application disclosed and claimed for the present invention. Further, the high conversion and selectivity efficiency meets the long felt but unmet need in the art of a method of oxidizing saturated aldehydes which provides high conversion efficiency and selectivity without use of metal catalyst. It is therefore believed that the claims are nonobvious under 35 U.S.C. § 103, and allowance is respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are respectfully requested.

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If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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